Central Maine Power Company
Substations (various)
Kennebec County
Augusta, Maine
A-952-71-A-N (SM)

Departmental
Findings of Fact and Order
Air Emission License

After review of the air emissions license application, staff investigation reports and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 M.R.S.A., Section 344 and Section 590, the Department finds the following facts:

I. REGISTRATION

A. Introduction

Central Maine Power Company (CMP) has applied for a new license to be permitted to install and operate up to four temporary portable diesel-fired engine/generator sets simultaneously. These units are to be used only on an as needed and where needed basis to support the continued transmission of power. Expected use will be during extreme weather-related electricity demand and construction, maintenance/repair, or reconfiguration of substations and transmission lines. The diesel units will each be rated at an approximate input capacity of 19 MMBtu/hr.

This license is based out of Augusta, the central office of Central Maine Power Company, but the units may be located throughout CMP's service area of central and southern Maine. The units shall all be included in an annual fuel use limit.

B. Emission Equipment

The following equipment is addressed in this air emission license:

Fuel Burning Equipment

Equipment	Maximum Capacity (MMBtu/hr)	Maximum Firing Rate (gal/hr)	Fuel Type, max. % sulfur
Portable Diesel Engine 1	19	135 to 136	Diesel, 0.05% sulfur
Portable Diesel Engine 2	19	135 to 136	Diesel, 0.05% sulfur
Portable Diesel Engine 3	19	135 to 136	Diesel, 0.05% sulfur
Portable Diesel Engine 4	19	135 to 136	Diesel, 0.05% sulfur

C. Application Classification

A new source is considered a major source based on whether or not expected emissions exceed the "Significant Emission Levels" as defined in Chapter 100 of the Department's regulations. The combined emission limits from the simultaneous operation of up to four diesel units are determined by the maximum future license allowed emissions, as follows:

Pollutant	Max. Future Licensed Allowed (TPY)	Sig. Level
PM	0.7	100
PM_{10}	0.7	100
SO_2	1.0	100
NO_x	57.5	100
CO	5.8	100
VOC	1.3	50

The maximum future licensed allowed limit was based on a 271,600 gallons/year fuel cap (on a 12 month rolling total).

This air emission license is determined to be a minor new source license and has been processed as such. The fuel cap limits the emissions below the major source

tons per year threshold, therefore the licensed source is considered to be a synthetic minor.

II. BEST PRACTICAL TREATMENT (BPT)

A. Introduction

In order to receive a license the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in Chapter 100 of the Department's regulations. Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas.

BPT for new sources and modifications requires a demonstration that emissions are receiving Best Available Control Technology (BACT), as defined in Chapter 100 of the Department's regulations. BACT is a top-down approach to selecting air emission controls considering economic, environmental and energy impacts.

B. Diesel Engines

CMP has proposed to license four mobile engine-generator sets, also called distributed generation or DG units, to be used during periods of exceptionally high electricity demand due to weather or during construction, maintenance/repair, or reconfiguration of substation and transmission lines. The proposed diesel-fired internal combustion engine generator sets will each be rated at approximately 19 MMBtu/hr. Each generator set is trailer-mounted and self contained with an integral diesel fuel tank. The unit(s) in use may be located at any one of CMP's substations within its central and southern Maine service area. The four-stroke cycle engines will fire fuel with a maximum sulfur content of 0.05%. By fall of 2010, the units will be required to fire ultra-low sulfur diesel (15 ppm = 0.015%). Emissions from each unit will exhaust through separate stacks approximately 13 feet above ground level. CMP shall be restricted to a total annual fuel use for all four units of 271,600 gal/year on a 12 month rolling total basis (equating to a total of approximately 2,000 operating hours per rolling 12 month period).

In the past, CMP has licensed several of these units for specific projects on a specific timeframe, but this licensing action gives flexibility in case the units are needed in unexpected situations to prevent rolling blackouts. This license will also allow CMP to use the units for planned system upgrades that may require temporary voltage support, similar to previous licenses. The units will be brought on site only during periods when additional voltage support is required locally. CMP shall notify the Department 30 days in advance notice of locating one or

more DG unit(s) at a substation, or as soon as possible in an emergency situation (but no later than 48 hours after the unit(s) installation).

The DG units used will either be a Caterpillar Model 3516B or Cummins Diesel Model QSK60-G6 Nonroad 1, or other models with similar or lower air emissions. The Caterpillar and Cummins models have a 2 MW generating capacity, use the same fuels, and have similar fuel consumption rates and emissions. The units will be operated inside the chain link substation fence and require no additional tanks or structures, except for a skid-mounted electrical transformer.

Federal New Source Performance Standards (NSPS) are not applicable to the diesel fired engines. NSPS apply to stationary engines and not non-road engines. Non-road engines are defined in part as equipment that is portable or transportable, as indicated by the presence of wheels, skids, carrying handles, dolly, trailer, or platform [40 CFR 1068.30]. The Reciprocating Internal Combustion Engine (RICE) Maximum Achievable Control Technology (MACT) only applies to units that are major sources of hazardous air pollutants (HAPS). The proposed fuel cap limits the emissions from the units below MACT and Prevention of Significant Deterioration (PSD) Program thresholds.

Central Maine Power Company submitted a BACT analysis for the diesel engines, addressing units found in EPA's RACT/BACT/LAER Clearinghouse, units licensed in Maine, and the technical and economic feasibility of those units. The following summarizes the BACT analysis for the diesel engines:

Propane-fired engines were considered but the propane-fired units take up at least twice as much space as the diesel-fired units and would need an additional area for a propane fuel tank. Also, natural gas or propane gas units work best when base loaded. The operations of the generator sets will require operational flexibility and therefore only diesel units were considered.

PM/PM_{10} – Particulate matter can be emitted from diesel units in different forms. PM can be exhausted as liquid particles (white smoke) during cold startups, idling, or low operation. Lubricating oil can leak into the combustion chamber and become partially burned, creating blue smoke. Soot (black smoke) is made up of a mass of carbon particles. Minimization of smoke emissions can occur with proper maintenance and operation of the engine.

Add-on controls were reviewed for further reduction of particulate matter, including a diesel oxidation catalyst. However, the flow rate from each of the proposed diesel units would require 7 or 8 catalyst units in parallel, costing over $50,000 per generator set. Based upon the small additional amount of

particulate matter reduction with control, the add-on alternative is not economically feasible.

Many of the currently operating diesel units reviewed used good combustion practices and a fuel (or hourly) limit to minimize particulate matter emissions. The Caterpillar DG unit is equipped with an Advanced Diesel Engine Management (ADEM) system which consists of the main electronic control module, control software, sensors, actuators, fuel injectors, and interface to the generator system. The Cummins DG unit is also equipped with power modules to monitor engine performance.

BACT for PM/PM_{10} from the diesel units is determined to be the fuel use limit of 271,600 gallons per year (12 month rolling total), a PM emission limit of 0.7 lb/hr per unit and 0.7 tons per year total, and the use of a Caterpillar, Cummins, or equivalent unit. The BACT PM emission limit is based on the Cummins unit which is higher than the Caterpillar model. The 0.7 lb/hr limit is below the 0.12 lb/MMBtu requirement in Chapter 103 of the Department's regulations (Fuel Burning Equipment Particulate Emission Standard).

SO_2 – Control technologies are available for the control of sulfur dioxide, but for internal combustion engines these technologies are not economically feasible. The most effective and most widely used control for SO_2 from diesel units is limiting the sulfur in the fuel.

BACT for SO_2 from the diesel units is determined to be the use of fuel oil that will not exceed 0.05% sulfur content, a fuel limit of 271,600 gallons per year (12 month rolling total), and an SO_2 emission limit of 1.0 lb/hr per unit and 1.0 tons per year total. The SO_2 emission limit was calculated on a mass basis, using 0.05% sulfur. Ultra-low sulfur diesel fuel (0.0015% sulfur) will be required to be fired as of fall 2010.

NO_X – Nitrogen oxides can form through thermal reactions of the nitrogen and oxygen in the combustion air and also from the nitrogen in the fuel. Most NO_X from internal combustion engines come from thermal NO_X. Two add-on controls for NO_X include selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR).

SCR is technically feasible for internal combustion engines, however SCR operation is dependent on catalyst reactor design, optimum operating temperature, sulfur content of the fuel, and design of the ammonia (NH_3) injection system. Several facilities in Maine were licensed with SCR on engines, but these facilities either are licensed for continuous engine operation, and/or have allowable emissions greater than the proposed tons per

year. In addition, there are some potential environmental impacts with using SCR, including ammonia slip, safety issues, and disposal of the spent catalyst. Renting SCR units were considered, but the vendors required the total cost of the unit to be recouped within the rental period. An alternative option was a purchase agreement. A received vendor quote was $200,000 (capital) per SCR system. Assuming the capital cost would be an additional $100,000 after the first unit, the total cost would be $500,000. If the SCR system controls 80% of the emissions (controlling 46 tons of NO_X), then without even considering operating costs and based on one year use, the cost of NO_X removal is $108,000 per ton. This cost demonstrates that the SCR installation is economically infeasible.

SNCR is not widely used on diesel engines, but there is a non-catalytic surface technology available to reduce NO_X emissions and it is manufactured by NO_XTECH. The NO_XTECH system reduces emissions autocatalytically using only gas-phase reactions. NO_X is reduced by injecting ammonia or urea and the gas-phase autocatalysis is self-sustained autothermally by fuel combustion in the exhaust gas. Supplemental fuel is used to maintain a specific temperature and the extra heat released is recovered for continued temperature control. NO_XTECH is technically feasible, although it operates efficiently only in a limited temperature range. The potential environmental impacts with using NO_XTECH include ammonia slip, safety issues, and additional fuel burning byproducts if the correct parameters are not maintained. A vendor quote was $250,000 capital per unit. Assuming the capital cost would be an additional $125,000 after the first unit, the total cost would be $625,000. If the NO_XTECH system controls 90% of the emissions (52 tons of NO_X), then without even considering operating costs and based on one year use, the cost of NO_X removal is $120,200 per ton. This cost demonstrates that the NO_XTECH installation is economically infeasible.

Ignition timing retard has been used as BACT on older model generator sets, however the newer model engines are more efficient than ignition timing retard.

A review of other diesel units in Maine showed that Merrill Blueberry, Robbins Lumber, and WPS New England Generation, Inc. all have diesel units and BACT is a tons per year limit of NO_X (20 tpy, 22.8 tpy, and 20 tpy, respectively).

BACT for NO_X from the diesel units is determined to be a fuel limit of 271,600 gallons per year (12 month rolling total), a NO_X emission limit of 57.5 lb/hr per unit and 57.5 tons per year total, and the use of a Caterpillar,

Cummins, or equivalent unit. The BACT NO_X emission limit is based on the Caterpillar unit which is higher than the Cummins model.

CO – Carbon monoxide forms from an incomplete reaction, occurring when the temperature is too low or the residence time is too short. Catalysts and lean-burn fuel mixtures can be used to control CO. The review of existing facilities showed that add-on controls were usually required for engines that were primary sources of power, not back up or emergency units.

BACT for CO from the diesel units is determined to be a fuel limit of 271,600 gallons per year (12 month rolling total), a CO emission limit of 5.8 lb/hr per unit and 5.8 tons per year total, and the use of a Caterpillar, Cummins, or equivalent unit. The BACT CO emission limit is based on the Cummins unit which is higher than the Caterpillar model.

VOC – Volatile organic compounds are exhausted when fuel remains partially unburned during combustion. This can occur with poor air-to-fuel ratios, incomplete mixing of fuel and air, large fuel droplets, and low cylinder temperatures. Catalysts can be used to control VOC emissions, however the review of existing facilities showed that add-on controls were usually required for engines that were primary sources of power, not back up or emergency units.

BACT for VOC from the diesel units is determined to a fuel limit of 271,600 gallons per year (12 month rolling total), a VOC emission limit of 1.3 lb/hr per unit and 1.3 tons per year total, and the use of a Caterpillar, Cummins, or equivalent unit. The BACT VOC emission limit is based on the Cummins unit which is higher than the Caterpillar model.

Opacity – The diesel units shall meet the opacity requirements in Chapter 101 of the Department's regulations (Visible Emissions). Visible emissions from each of the diesel engines shall not exceed an opacity of 20% on a six (6) minute block average basis, except for no more than two (2) six (6) minute block averages in a 3-hour period.

C. Annual Emissions

The portable DG units shall be restricted to the following annual emissions (based on a total of 271,600 gallons per year of diesel fuel on a 12 month rolling total):

Total Licensed Annual Emission for the Facility
Tons/year
(used to calculate the license fee)

	PM	PM_{10}	SO_2	NO_x	CO	VOC
Total from 4 Diesel Generators	0.7	0.7	1.0	57.5	5.8	1.3

III. AMBIENT AIR QUALITY ANALYSIS

According to Chapter 115 of the Department's regulations, the level of air quality analyses required for a minor new source shall be determined on a case-by case basis. Based on the information available in the file, the similarity to existing sources, and the licensed tons per year emissions, Maine Ambient Air Quality Standards (MAAQS) will not be violated by this source.

ORDER

Based on the above Findings and subject to conditions listed below, the Department concludes that the emissions from this source:

- will receive Best Practical Treatment,
- will not violate applicable emission standards,
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants Air Emission License A-952-71-A-N subject to the following conditions.

Severability. The invalidity or unenforceability of any provision, or part thereof, of this License shall not affect the remainder of the provision or any other provisions. This License shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

STANDARD CONDITIONS

(1) Employees and authorized representatives of the Department shall be allowed access to the licensee's premises during business hours, or any time during which any emissions units are in operation, and at such other times as the Department

deems necessary for the purpose of performing tests, collecting samples, conducting inspections, or examining and copying records relating to emissions (38 MRSA §347-C).

(2) The licensee shall acquire a new or amended air emission license prior to commencing construction of a modification, unless specifically provided for in Chapter 115. [MEDEP Chapter 115]

(3) Approval to construct shall become invalid if the source has not commenced construction within eighteen (18) months after receipt of such approval or if construction is discontinued for a period of eighteen (18) months or more. The Department may extend this time period upon a satisfactory showing that an extension is justified, but may condition such extension upon a review of either the control technology analysis or the ambient air quality standards analysis, or both. [MEDEP Chapter 115]

(4) The licensee shall establish and maintain a continuing program of best management practices for suppression of fugitive particulate matter during any period of construction, reconstruction, or operation which may result in fugitive dust, and shall submit a description of the program to the Department upon request. [MEDEP Chapter 115]

(5) The licensee shall pay the annual air emission license fee to the Department, calculated pursuant to Title 38 M.R.S.A. §353. [MEDEP Chapter 115]

(6) The license does not convey any property rights of any sort, or any exclusive privilege. [MEDEP Chapter 115]

(7) The licensee shall maintain and operate all emission units and air pollution systems required by the air emission license in a manner consistent with good air pollution control practice for minimizing emissions. [MEDEP Chapter 115]

(8) The licensee shall maintain sufficient records to accurately document compliance with emission standards and license conditions and shall maintain such records for a minimum of six (6) years. The records shall be submitted to the Department upon written request. [MEDEP Chapter 115]

(9) The licensee shall comply with all terms and conditions of the air emission license. The filing of an appeal by the licensee, the notification of planned changes or anticipated noncompliance by the licensee, or the filing of an application by the licensee for a renewal of a license or amendment shall not stay any condition of the license. [MEDEP Chapter 115]

(10) The licensee may not use as a defense in an enforcement action that the disruption, cessation, or reduction of licensed operations would have been necessary in order to maintain compliance with the conditions of the air emission license. [MEDEP Chapter 115]

(11) In accordance with the Department's air emission compliance test protocol and 40 CFR Part 60 or other method approved or required by the Department, the licensee shall:

A. perform stack testing to demonstrate compliance with the applicable emission standards under circumstances representative of the facility's normal process and operating conditions:
   1. within sixty (60) calendar days of receipt of a notification to test from the Department or EPA, if visible emissions, equipment operating parameters, staff inspection, air monitoring or other cause indicate to the Department that equipment may be operating out of compliance with emission standards or license conditions; or
   2. pursuant to any other requirement of this license to perform stack testing.

B. install or make provisions to install test ports that meet the criteria of 40 CFR Part 60, Appendix A, and test platforms, if necessary, and other accommodations necessary to allow emission testing; and

C. submit a written report to the Department within thirty (30) days from date of test completion.

[MEDEP Chapter 115]

(12) If the results of a stack test performed under circumstances representative of the facility's normal process and operating conditions indicate emissions in excess of the applicable standards, then:

A. within thirty (30) days following receipt of such test results, the licensee shall re-test the non-complying emission source under circumstances representative of the facility's normal process and operating conditions and in accordance with the Department's air emission compliance test protocol and 40 CFR Part 60 or other method approved or required by the Department; and

B. the days of violation shall be presumed to include the date of stack test and each and every day of operation thereafter until compliance is demonstrated under normal and representative process and operating conditions, except to the extent that the facility can prove to the satisfaction of the Department that there were intervening days during which no violation occurred or that the violation was not continuing in nature; and

C. the licensee may, upon the approval of the Department following the successful demonstration of compliance at alternative load conditions, operate under such alternative load conditions on an interim basis prior to a demonstration of compliance under normal and representative process and operating conditions.

[MEDEP Chapter 115]

(13) Notwithstanding any other provisions in the State Implementation Plan approved by the EPA or Section 114(a) of the CAA, any credible evidence may be used for the purpose of establishing whether a person has violated or is in violation of any statute, regulation, or Part 70 license requirement. [MEDEP Chapter 115]

(14) The licensee shall maintain records of malfunctions, failures, downtime, and any other similar change in operation of air pollution control systems or the emissions unit itself that would affect emission and that is not consistent with the terms and conditions of the air emission license. The licensee shall notify the Department within two (2) days or the next state working day, whichever is later, of such occasions where such changes result in an increase of emissions. The licensee shall report all excess emissions in the units of the applicable emission limitation. [MEDEP Chapter 115]

(15) Upon written request from the Department, the licensee shall establish and maintain such records, make such reports, install, use and maintain such monitoring equipment, sample such emissions (in accordance with such methods, at such locations, at such intervals, and in such a manner as the Department shall prescribe), and provide other information as the Department may reasonably require to determine the licensee's compliance status. [MEDEP Chapter 115]

SPECIFIC CONDITIONS

(16) **Internal Combustion Diesel Engines (four units)**

A. CMP may simultaneously utilize up to four mobile engine-generator sets (distributed generation units) to be used during periods of exceptionally high electricity demand due to weather or during construction, maintenance/repair, or reconfiguration of substations and transmission lines. The units shall be installed and utilized only during periods when additional voltage support is required locally. The diesel-fired internal combustion engine generator sets shall each not exceed a rating of 19 MMBtu/hr. [MEDEP Chapter 115, BACT]

B. The four portable distributed diesel-fired distributed generation units shall each not exceed the following emission limits [MEDEP Chapter 115, BACT]:

Pollutant	lb/hr
PM *	0.7
PM_{10}	0.7
SO_2	1.0
NO_x	57.5
CO	5.8
VOC	1.3

* Per Chapter 103 of the Department's regulations, each of the diesel engines shall not exceed 0.12 lb PM/MMBtu.

C. Prior to October of 2010, total fuel use for the four diesel engines shall not exceed a total of 271,600 gal/yr (12 month rolling total) of diesel fuel oil with a maximum sulfur content not to exceed 0.05% by weight. Compliance shall be demonstrated by fuel receipts from the supplier showing the quantity of fuel delivered and the percent sulfur of the fuel. Records of fuel use shall be kept on a monthly and a 12 month rolling total basis. [MEDEP Chapter 115, BACT]

D. In October of 2010 and thereafter, total fuel use for the four diesel engines shall not exceed a total of 271,600 gal/yr (12 month rolling total) of ultra-low sulfur diesel fuel oil with a maximum sulfur content not to exceed 0.0015% by weight. Compliance shall be demonstrated by fuel receipts from the supplier showing the quantity of fuel delivered and the percent sulfur of the fuel. Records of fuel use shall be kept on a monthly and a 12 month rolling total basis. [MEDEP Chapter 115, BACT]

E. A unit (or units) shall not operate at one location for more than a total of 500 hours for a specific power support scenario. Operating records shall be maintained to demonstrate compliance with this condition. [MEDEP Chapter 115, BACT]

F. Visible emissions from the each of the four diesel engines shall not exceed 20% opacity on a six (6) minute block average basis, except for no more than two (2) six (6) minute block averages in a 3-hour period. [MEDEP Chapter 101]

G. CMP shall notify the Department of the use and location of the generator units. CMP shall notify the Department at least 30 day in advance of a planned installation of one or more DG units, or as soon as possible (but no later than 48 hours after installing the DG unit(s)) in an emergency situation. Written notice may be sent by mail, facsimile (fax), or e-mail. Notification by mail shall be sent to the address below or to a Department Regional Office:

Attn: Relocation Notice
Maine DEP
Bureau of Air Quality
17 State House Station
Augusta, ME 04333-0017

Written notification shall also be made to the municipality where the equipment will be relocated, except in the case of an unorganized territory where notification will be made to the respective county commissioners. This notification shall be on the same timeline as stated above.

The notification shall include the model(s), size(s), and number of unit(s) being used, the substation address(es), the need for the unit(s), and the license number (A-952).

[MEDEP Chapter 115, BACT]

(17) **Annual Emission Statement**

In accordance with MEDEP Chapter 137, the licensee shall annually report to the Department the information necessary to accurately update the State's emission inventory by means of:

1) A computer program and accompanying instructions supplied by the Department; or
2) A written emission statement containing the information required in MEDEP Chapter 137.

Reports and questions should be directed to:

Attn: Criteria Emission Inventory Coordinator
Maine DEP
Bureau of Air Quality
17 State House Station
Augusta, ME 04333-0017 Phone: (207) 287-2437

The emission statement must be submitted by July 1 or as otherwise specified in Chapter 137.

(18) **Malfunction/Breakdown**

The licensee shall notify the Department within 48 hours and submit a report to the Department on a quarterly basis if a malfunction or breakdown in any component causes a violation of any emission standard. [Title 38 MRSA §605]

(19) **Payment of Annual License Fee**

CMP shall pay the annual air emission license fee within 30 days of October 30th of each year. Pursuant to 38 MRSA §353-A, failure to pay this annual fee in the stated timeframe is sufficient grounds for revocation of the license under 38 MRSA §341-D, subsection 3.

DONE AND DATED IN AUGUSTA, MAINE THIS DAY OF , 2006.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY:_____
DAVID P. LITTELL, COMMISSIONER

The term of this license shall be five (5) years from the signature date above.

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: August 18, 2006
Date of application acceptance: August 21, 2006

Date filed with the Board of Environmental Protection: _____

This Order prepared by Kathleen E. Tarbuck, Bureau of Air Quality.